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THE SITUATION

ACTION MEMORANDUM

SITE NAME AND LOCATION

USDOE Hanford 100 Area NPL
100-IU-3 Operable Unit (Wahluke Slope)
Hanford Site
Adams, Grant, and Franklin Counties, Washington



I. STATEMENT OF BASIS AND PURPOSE

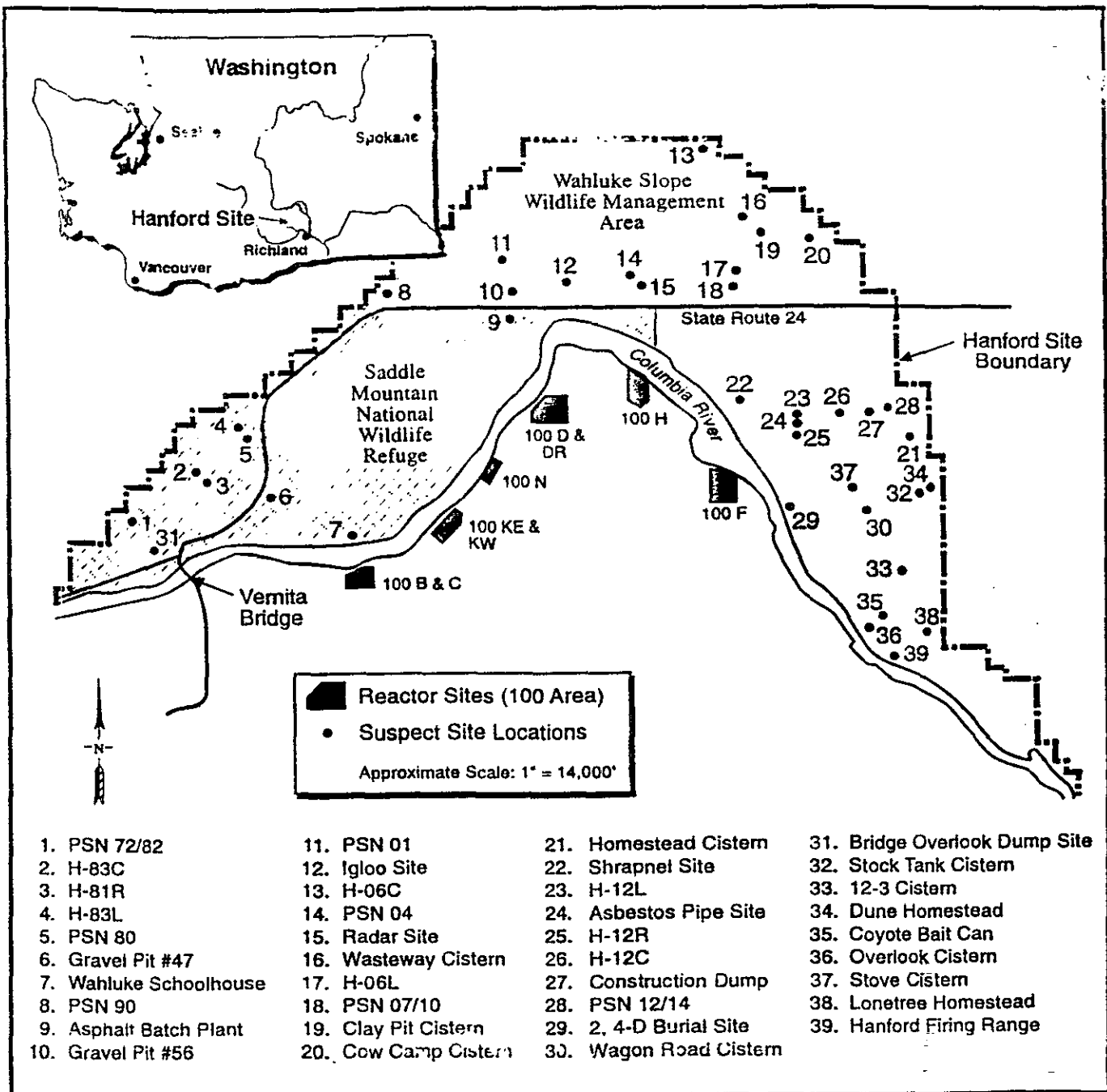
The purpose of this time-critical removal action is to reduce risks to human health and the environment associated with the 2,4-D Burial Site (ID number 600-104) located within the 100-IU-3 Operable Unit (Figure 1). This action memorandum has been developed in accordance with and under the authority of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act* (SARA), and to the extent practicable the *National Contingency Plan* (NCP). This action memorandum is based on the administrative record for this project.

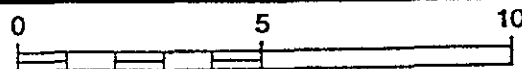
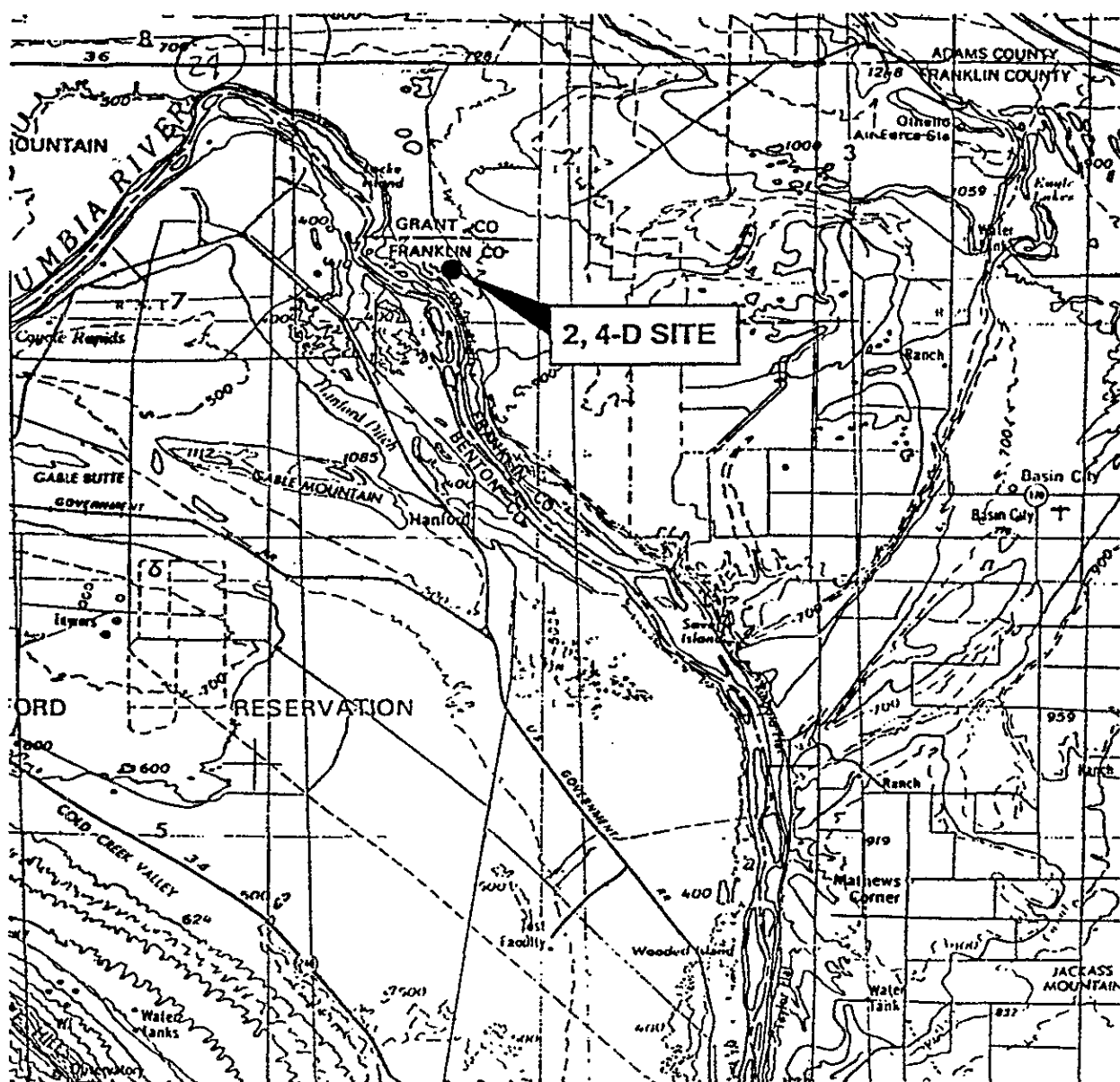
While the 100-IU-3 Operable Unit expands over three counties, the 2,4-D Burial Site is located in Franklin County, Township 27 East, Range 14 North, Section 35 (Figure 2). This waste site is approximately 25 miles north of the city of Richland, Washington and 0.5 miles east of the Columbia River, on lands managed by the Washington State Department of Wildlife (Wildlife) as the Wahluke Slope Recreation Area under permit from U. S. Department of Energy (USDOE). A time-critical removal action has been chosen for this action based on the following considerations: existing contamination levels have the potential to be harmful to human health and environment; rapid decomposition of 2,4-D occurs during bioremediation, especially during summer heat; the waste site is publicly accessible; and resources are available to conduct the work immediately.

II. BACKGROUND AND SITE CONDITIONS

The chemical 2,4-D (2,4-dichlorophenoxyacetic acid) is a commercial chlorinated herbicide used to control vegetation growth. Application of the herbicide was and continues to be performed by the U. S. Bureau of Reclamation (USBOR) on the Wahluke Slope to control vegetation along irrigation canals. USBOR stations throughout the Columbia Basin stored 2,4-D in underground storage tanks. In 1966, the USBOR removed from service 11 tanks, each measuring 12 feet in length and 4 feet in diameter because of known and suspected leakage. The USBOR received permission from the Atomic Energy Commission to dispose of the tanks and associated soil at the Wahluke Slope 2,4-D Burial Site. The Burial Site is 400 feet long, 12 feet wide, and 4 feet deep trench. However, the Hanford Waste Information Data Base indicates the trench to be 60

Figure 1: Wahluke Slope (100-IU-3 Operable Unit) 2,4-D Burial Site





Scale in Miles
1:250,000

FIGURE 2 - Vicinity Map

(USGS TOPOGRAPHIC MAP OF
WALLA WALLA, WA, 1951)

PROJECT	35204
DATE	3-19-94
BY	SW
REVIEWED	SW

CORPS OF ENGINEERS
HANFORD 2,4-D SITE

HANFORD, NORTH SLOPE



CASCADE EARTH SCIENCES, LTD.
Oregon - Washington - Idaho

Figure 3: 2,4-D Burial Site and 1993 Sample Locations

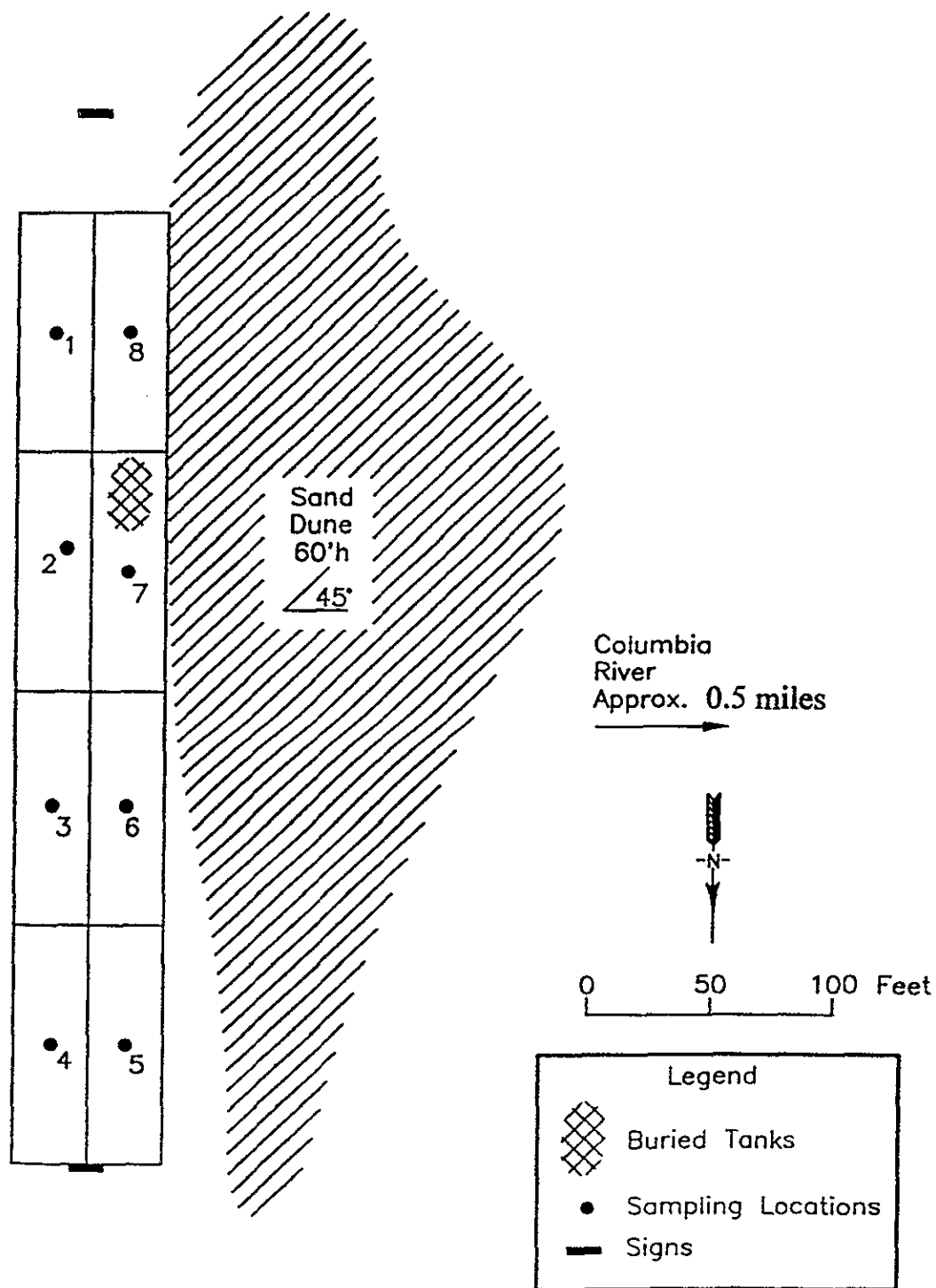
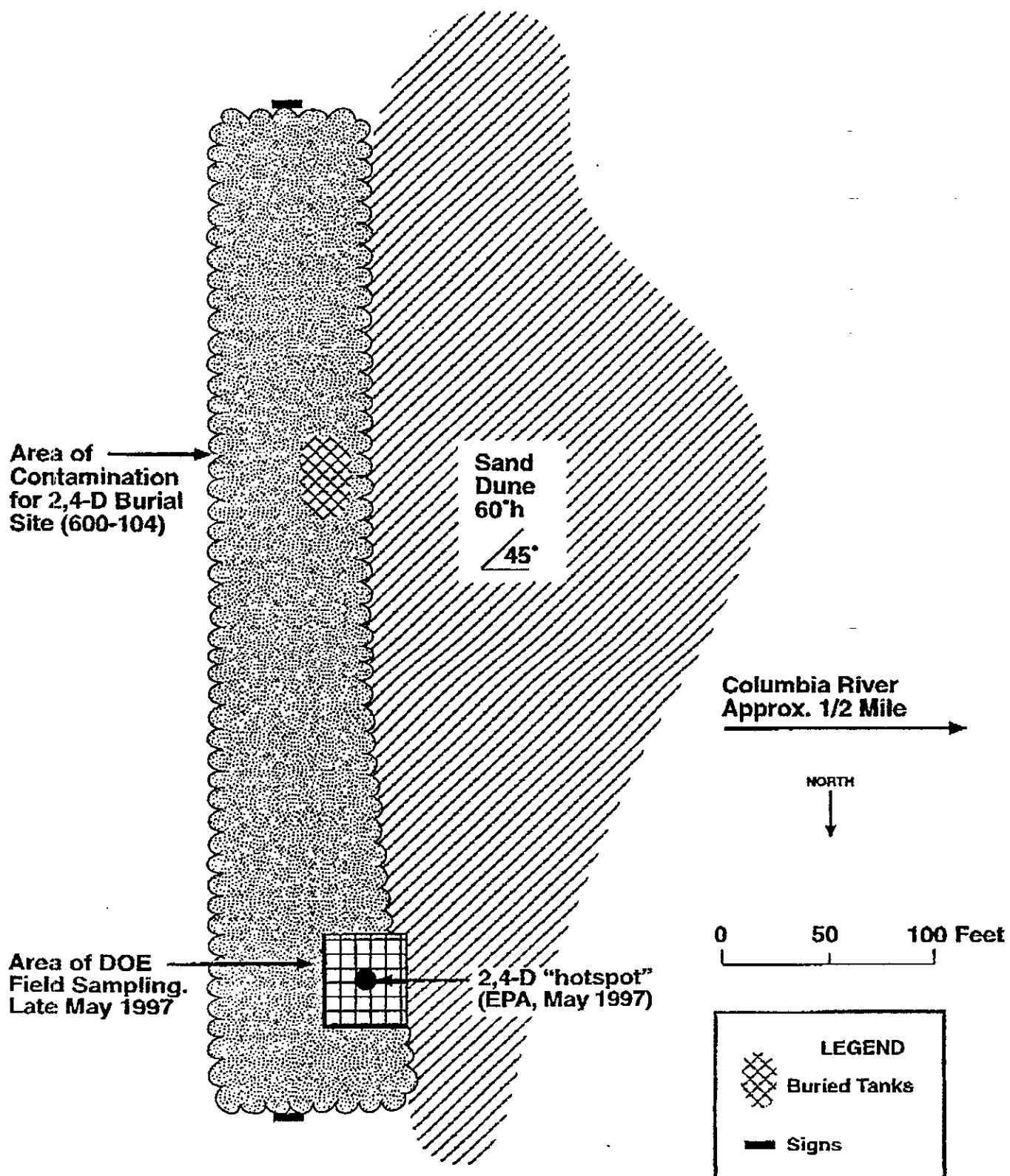


Figure 4. 2,4-D Burial Site Area of Contamination



feet wide. The tanks were emptied prior to transporting to the 2,4-D Burial Site. In September 1967, the tanks were disposed of at the Wahluke Slope 2,4-D Burial Site and 3 feet of soil cover was placed over them. In addition to the tanks, it was estimated that 50 cubic yards of contaminated soil containing 2,4-D was also disposed. However, the specific location in the trench and date disposed are not documented. This Burial Site had no further disposal activities after 1967.

In 1993, Westinghouse Hanford Company investigated the 2,4-D Burial Site using a rotary auger drilling rig to obtain soil samples, and geophysics surveys to verify the location of the buried, crushed tanks (Figure 3). Sampling data indicated 2,4-D at approximately 2 ppm (parts per million), which was well below the cleanup standard of 800 ppm as based on the state *Model Toxics Control Act* (MTCA), Method B. Sampling was conducted at depths ranging from 6 to 15 feet at 8 different locations spanning the suspected length of the burial site. Field screening kits were utilized as well as laboratory analysis. Sampling data are documented in the *North Slope (Wahluke Slope) Expedited Response Action Cleanup Plan, DOE/RL-93-47, Revision 0, Appendices G and H*.

In 1994, the Washington State Department of Ecology (Ecology), USDOE, and the Environmental Protection Agency (EPA) issued a non-time critical action memorandum to cleanup various waste sites on the Wahluke Slope; however based on previous sampling data only verification sampling was required for the 2,4-D Burial Site. In July 1994, the U. S. Army Corps of Engineers investigated the site, which focused on the soils beneath the buried, crushed tanks for potential releases and impacts to groundwater. The investigation involved inclined drilling. A total of 4 borings were drilled to depths of approximately 20 feet, angled at 30 degrees. Samples were obtained at various depths with a total of 4 samples per boring. 2,4-D was not detected, and sample data were below 2 ppm. Sampling data are documented in the *U. S. Army Corps of Engineers 2,4-D Site Report, August 25, 1994*. Following the cleanup, a Record of Decision for the entire Wahluke Slope (100-IU-3) was issued in February 1996 indicating no further action was warranted on any waste sites.

In March 1997, a hunter noticed the 2,4-D Burial Site on the Wahluke Slope and believed contamination still remained in the soil. He contacted the EPA, Region 10 in Seattle. EPA toured and investigated the site on May 3, 1997 with the hunter and conducted cursory sampling by digging 4 small pits 3 feet in diameter and 2 feet deep using shovels. The pits were located within 5 to 10 feet from the base of the sand dune and at various locations north of the buried tanks. Location of the pits were based on stressed vegetation and were placed randomly 20 to 200 feet north of the buried tanks. During the investigation, strong chemical odors were encountered. Sampling results from 1 of 4 pits indicated 2,4-D concentrations at 2500 ppm, also known as the "hot spot" (Figure 4). Sampling data from the other pits contained 2,4-D below the 800 ppm cleanup standard. Sampling data are contained in the administrative record.

Based on the recent detection of 2,4-D, USDOE and Ecology approved a sampling plan in May 1997 to further characterize the extent of the contamination at the one pit

containing the 2500 ppm 2,4-D (Figure 4). The objectives were to determine the lateral extent and depth of contamination, calculate the volume of contaminated soil, and compare this information against historical data. Sampling data indicated 2,4-D at levels as high as 17,000 ppm and approximately 20 cubic yards of contaminated soil above the cleanup standard. Additionally, the analysis of the 17,000 ppm 2,4-D sample also contained dioxins exceeding the MTCA, Method B cleanup standard of 0.00000667 ppm (based on 2,3,7,8 TCDD). Contamination was detected at depths between 2 to 8 feet. Furthermore, EPA performed additional sampling in other areas along the trench using a hand auger to depths up to 5 feet. Sampling data indicated further 2,4-D levels ranging from 1000 to 1300 ppm. Sampling data are contained in the administrative record.

Conditions at the 2,4-D Burial Site are that the soil is primarily sandy and dry on the surface with a moisture horizon at 3 to 5 feet, depth to groundwater is approximately 300 feet, annual rainfall is 6 to 12 inches/year, and the average temperature in the summer is 85 to 90 degrees. The area surrounding the waste site is an isolated, arid environment; it is accessible for day use by the public, mainly hunters. 2,4-D is potentially mobile, but based on low rainfall and site conditions it has not migrated significantly. Other characteristics of 2,4-D are that it degrades readily in warm, moist soil and the rate of breakdown increases with temperature, acidity, and organic matter. Typical 2,4-D field half-life is 10 days during normal application. Wildlife in the area does exist and includes many types of birds, mammals, reptiles, and amphibians. A complete flora and fauna survey of the entire Wahluke Slope is documented in *North Slope (Wahluke Slope) Expedited Response Action Cleanup Plan, DOE/RL-93-47, Revision 0, Appendix K*.

Ecology is the lead regulatory agency for the time-critical removal action, including preparation of the action memorandum. EPA will assist as necessary, and shall determine the acceptability of the off-site waste facility through an "off-site waste determination." USDOE is the party having jurisdiction over the disposal site and the party responsible for conducting the cleanup in accordance with this action memorandum.

III. THREATS TO PUBLIC HEALTH OR THE ENVIRONMENT

Based on the sampling events conducted at the 2,4-D Burial Site in May 1997, 2,4-D exists at levels above human health standards (800 ppm). Soil contamination has been detected at levels as high as 17,000 ppm. Additionally, the soil containing 17,000 ppm of 2,4-D contains small quantities of dioxins that exceed human health standards. Other sampling data within the Burial Site indicates 2,4-D levels ranging from 200 ppm to 1300 ppm. The contamination extends to depths of 10 feet. Strong chemical odors were also present during shallow digging by EPA. Groundwater is 300 feet below the Burial Site and is not impacted. Contamination is expected throughout the entire trench length. Concentrations of 2,4-D vary within the trench and adjacent areas as indicated by previous sampling data. Waste volume projections are: 1) 500 cubic yards of contaminated 2,4-D soil; 2) 20 cubic yards of 2,4-D soil with dioxin; 3) 350 gallons of rinse water containing 2,4-D and dioxin; 4) 1 cubic yard of solid waste; and 5) 11

emptied, crushed tanks each 12 feet in length and 4 feet in diameter. These soil estimates are higher than historical records because contaminated soil had been placed randomly throughout the trench and then spread, thereby increasing the amount of contaminated soil when mixed with native soil.

Because the area is managed by Wildlife under permit from USDOE, Hanford security does not patrol this area. The only existing security is county sheriffs and Wildlife officials who have a sign posted at the roadway to the 2,4-D Burial Site indicating that no vehicles are allowed past that point. Primary risks posed by this site would be limited to an individual digging into the soil at depths greater than 1 foot, breathing the fumes, and contacting the soil.

Besides soil contaminated with 2,4-D, there are 11 empty, crushed tanks disposed of at the 2,4-D Burial Site in one central location. Historical records state the tanks were crushed at the site and contained crystallized 2,4-D and residues. While previous sampling data indicate no releases of 2,4-D from the tanks, the potential for release from the crystallized and residues could pose a risk, although minimal, to an individual digging into the soil and breaching the tanks. Risks to the individual would occur from breathing the fumes, and contacting the tanks and soil.

Concentrations of 2,4-D do exist at levels potentially dangerous to birds, mammals, reptiles and amphibians. This area contains substantial quantities of wildlife. While no adverse effects on wildlife have been detected, this area is checked infrequently and small changes in wildlife populations may go undetected. 2,4-D contamination is located at shallow depths well within range of small burrowing animals that are sensitive to 2,4-D.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in the action memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment. Completion of the proposed actions contained within this action memoranda shall be protective of human health and the environment, and meet residential cleanup standards achieved for all other known waste sites on the Wahluke Slope. Therefore, no further action is expected after completion of this removal action.

V. REMOVAL ACTIONS AND ESTIMATED COSTS

The removal action objective is to protect human health and the environment from exposure to concentrations of 2,4-D and dioxins that are above cleanup standards. Based on this objective, the following removal action goals have been established: 1) prevent exposure to 2,4-D contaminated soil that exceeds 800 ppm, 2) prevent exposure to 2,4-D contaminated soil containing dioxins exceeding 0.00000667 ppm, 3) remove the emptied, crushed tanks, and 4) be protective of workers performing the work.

This removal action contains three elements to achieve these goals. These are:

- First, 2,4-D contaminated soil containing dioxins above cleanup standards shall be excavated and disposed off-site to a permitted hazardous waste disposal facility.
- Second, the remaining contaminated soil containing 2,4-D above cleanup standards shall be bioremediated, on location, within the area of contamination (Figure 4). Following bioremediation, the soil shall be returned to its original location.
- Third, contaminated emptied, crushed tanks shall be excavated, internal surfaces cleaned to remove crystallized 2,4-D and residues, and rinsed as necessary to allow disposal of the tanks to the Environmental Restoration Disposal Facility (ERDF) at Hanford. Because the tanks are crushed and unable to be utilized for their intended purpose, the tanks are considered debris. The material removed from the internal tanks surfaces shall be disposed off-site to a permitted hazardous waste disposal facility. Rinse water shall either be disposed of off-site to a permitted hazardous waste disposal facility or utilized as a water source for the bioremediation effort; depending on whether dioxin levels exceed 0.000000583 ug/L (micrograms/liter) as stated in MTCA, Method B for groundwater. Should residue removal be considered impracticable, the tanks shall be disposed off-site to a permitted disposal facility.

Bioremediation is a process in which contamination is naturally degraded using bacteria in the presence of sufficient water, organic matter, and temperature. 2,4-D decomposes rapidly by bacteria, also known as microbial activity. The arid climate surrounding the Burial Site is hot (during summer and early fall) and with sufficient organic matter and water, native bacteria can thrive and naturally decompose 2,4-D. Advantages of bioremediation are: no cost for disposal and transportation, less machinery is needed and will cause less disturbance to the surrounding areas, and the climate and soil conditions in this region will adequately support bioremediation. Approval of a time-critical removal action will allow bioremediation to occur during the summer months when decomposition of 2,4-D will be optimum. Undertaking a nontime-critical removal action would delay the schedule until late fall when climate conditions are not as favorable.

Prior to shipping waste off-site, EPA will make an acceptability determination that the receiving facility is able to accept waste from this action. This action memorandum allows the use of any permitted facility authorized to handle the 2,4-D Burial Site waste, depending on cost and EPA's off-site waste determination. Disposal prices range from \$500/ton to \$5000/ton.

Total estimated cost for this removal action ranges between \$200,000 to \$300,000. The cost breakdown is as follows: 1) \$228,000 for off-site waste disposal, 2) \$60,000 for bioremediation, and 3) \$12,000 for tank cleaning and disposal. Factors that could significantly effect the price are quantities of waste requiring off-site disposal and the complexity of cleaning the internal surfaces of the tanks. Other alternatives were

analyzed such as capping and complete off-site waste disposal. The total cost for complete off-site waste disposal, if bioremediation was not utilized, is approximately \$2,000,000. Capping would require continued monitoring, and would be inconsistent with previous cleanup actions on the Wahluke Slope.

The projected schedule for this removal action is to begin field work in August 1997 and complete off-site waste removal by November 1997. Bioremediation will proceed from August 1997 to December 1997; although earlier completion may be possible.

Specific plans that must be submitted to Ecology for approval and/or review during the course of implementing this action memorandum are:

1. Sampling and Analysis Plan (SAP) (approval required) which shall cover the excavated Burial Site to ensure all contamination is removed;
2. SAP (approval required) which shall cover the designation and sampling for all off-site waste shipments;
3. SAP (approval required) which shall cover final soil verification samples for determining completion of bioremediation;
4. Bioremediation Plan (review only) describing procedures to be used; and
5. Health and Safety Plan (review only) for all work performed in the field.

In accordance with 40 Code of Federal Regulations 300.820(b), USDOE shall make all documents in the administrative record for this action available for public inspection within 60 days from starting field removal actions. Notice of the administrative record file availability shall be published in a major local newspaper of general circulation. USDOE shall provide a 30-day public comment, if requested, at the start of the administrative record availability to the public. USDOE shall respond in writing to significant comments and place those responses in the administrative record.

VI. APPLICABLE, OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARAR'S)

This time-critical removal action shall be conducted in accordance with the following ARAR's, found to be practicable: state of Washington Administrative Code (WAC), Chapter 173-340, "*Model Toxics Control Act* (MTCA); WAC, Chapter 173-303, "*Dangerous Waste Regulations*"; 40 *Code of Federal Regulations* (CFR) 300; *Resource Conservation and Recovery Act* (RCRA) of 1976; 40 CFR 268, "*Land Disposal Restriction* (LDR)"; 16 CFR 470, "*National Historic Preservation Act*"; 40 CFR 402, "*Endangered Species Act*"; 29 CFR 1910, "*Hazardous Worker Training and Material Handling*".

VII. FINAL DETERMINATION

Based on sampling data at the 2,4-D Burial Site on the Wahluke Slope, contamination exists that is above state cleanup standards and is potentially dangerous to human health and the environment. Implementing the removal action described in Section V shall eliminate threats to human health and the environment from the 2,4-D Burial Site. Following completion of the removal action, EPA will continue the deletion process from the National Priorities List (NPL). This decision is based on the administrative record for this project.



Michael Wilson, Manager
Nuclear Waste Program
Washington State Department of Ecology

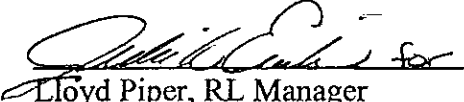
Lloyd Piper, RL Manager
U. S. Department of Energy
Richland Operations Office

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